# ABBE REFRACTOMETERS

*Made by*

ADAM HILGER

LIMITED

# ABBE REFRACTOMETERS

# ABBE REFRACTOMETER

WITH

# WATER JACKETED PRISMS

October 1st, 1918


ADAM HILGER LIMITED

75A CAMDEN ROAD · LONDON · N.W.1

*Nearest Stations :*

CAMDEN TOWN *on the* HAMPSTEAD & HIGHGATE TUBE RAILWAY

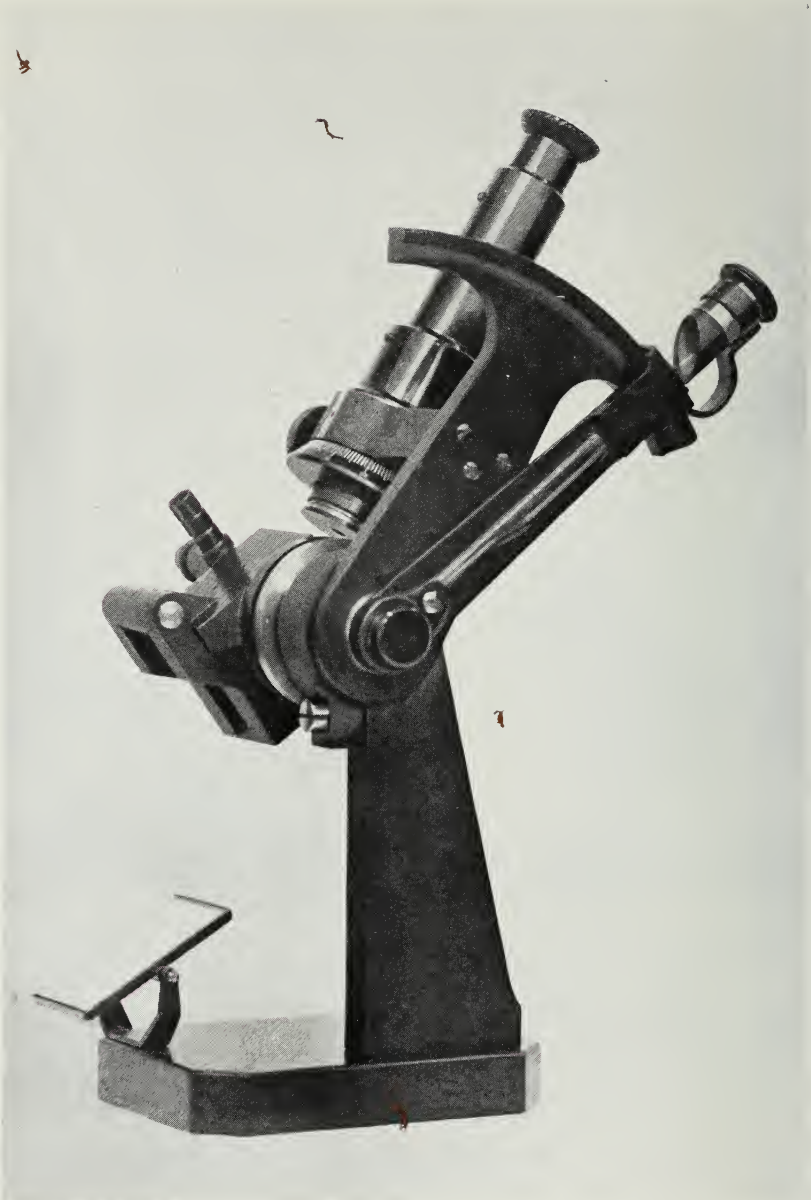
CAMDEN TOWN *on the* NORTH LONDON RAILWAY

*Telegraph :* SPHERICITY · CAMROAD · LONDON

*Telephone :* N. 1677 and 1678

*Cable address :* SPHERICITY, LONDON

*Cable code :* WESTERN UNION



# ABBE REFRACTOMETER

In general the refractometer may with advantage replace the hydrometer or specific gravity bottle where liquid products have to be controlled.

¶ The refractive indices of liquids give valuable information concerning the purity of oils and other substances, and the strength of aqueous, alcoholic, ethereal, and other solutions. Mixtures of two liquids are also readily analysed by the use of the refractometer.

¶ The instrument is continually finding new applications in a variety of industries; among the substances controlled by it are butter, edible and technical fats, oils, waxes, sugars, syrups, essential oils, glue, gelatine, and the materials and products of the petroleum, paint, varnish, gas, tanning, brewing and distilling, margarine and drug-extracting industries.

¶ The refractometer has also been valuable in many isolated cases, such as the determination of camphor, methyl alcohol, etc.

¶ No other physical measurement can be so quickly made as that of the refractive index by means of the Abbe Refractometer, and this

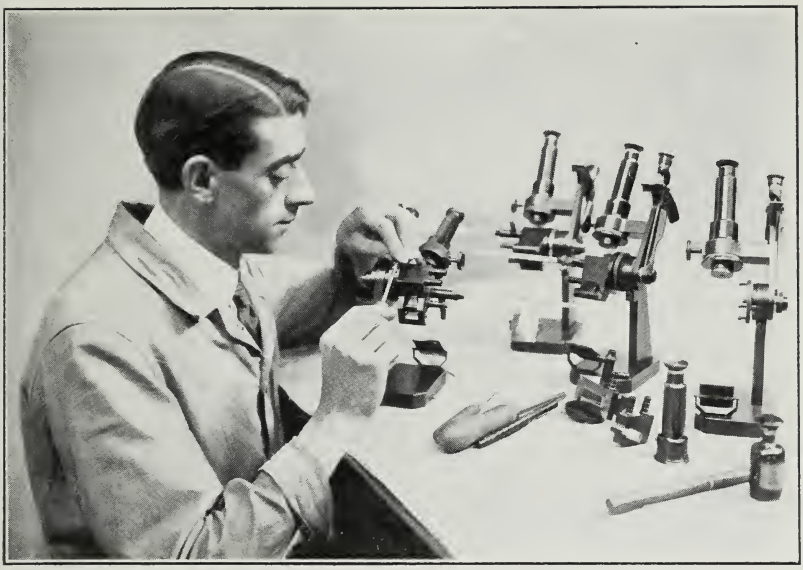
property is a very sensitive and accurate indication of variations. When it is added that one obtains simultaneously a measurement of a second physical property, viz., the dispersion, it will be realised how valuable a tool the instrument may become in every chemical laboratory. One or two drops only of liquid are required.

¶ So thin is the film of liquid employed that turbid and highly coloured liquids which would absorb too much light in other forms of refractometer can be investigated with the Abbe.

¶ Finally, wherever the proportion of solvent to substance dissolved is often required to be known, a refractometer affords the quickest means of obtaining the information.

¶ *Description.*—The Abbe Refractometer is shown in the frontispiece. A very complete description of its principles, applications, treatment, adjustment, and use, is given in our booklet "Instructions for use of the Abbe Refractometer," a copy of which will be sent post free on application. The following brief account will therefore suffice for the purposes of this leaflet.

¶ The range of retractive indices measurable



by the instrument is from 1.3$^{000}$ to 1.7$^{000}$ and the accuracy of reading is 0·0001.

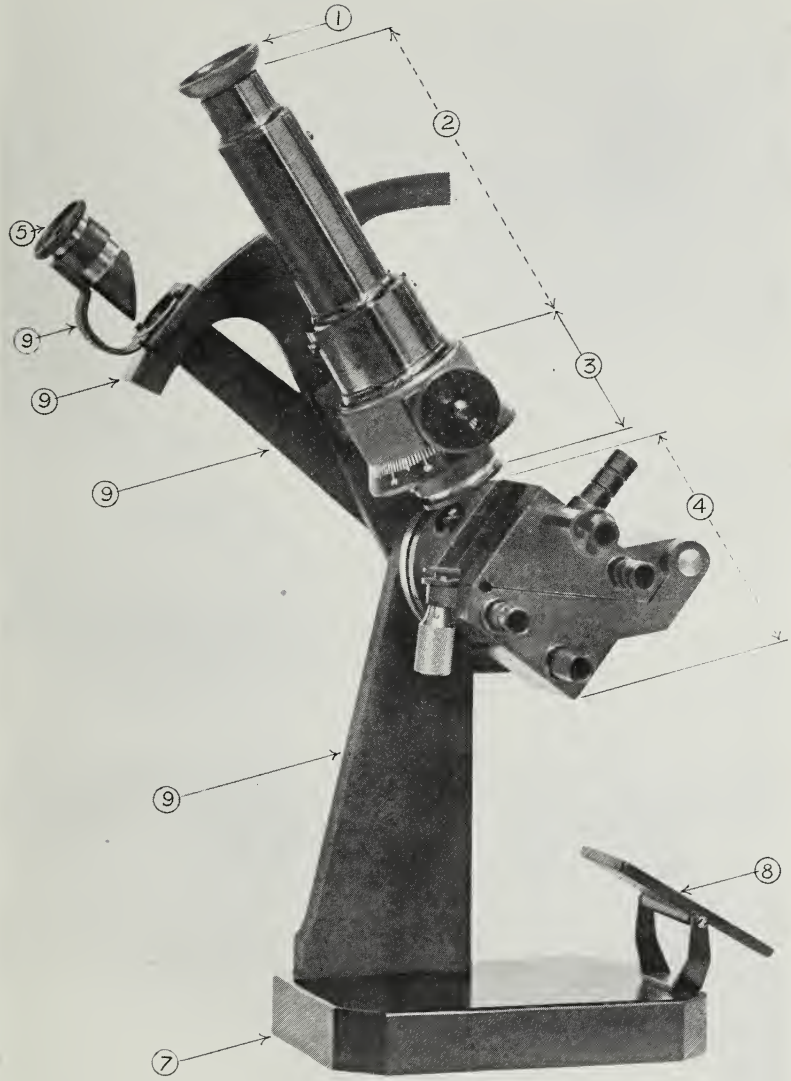
¶ Measurements may be made using either daylight or artificial light; very little liquid (one or two drops only) is required to make a determination; and the refractive index is read directly on the scale. Dispersions are obtained by reference to printed tables, which together with full printed instructions for use are issued with each instrument. In addition to the scale of refractive indices a scale of percentage of "Dry Substance" can be supplied, if desired, for sugar work.

¶ The liquid to be investigated is enclosed as a film between two prisms of dense flint glass. The upper prism has a polished face in contact with the liquid and it is the ray which grazes this face which is utilised in making measurements. Each prism is enclosed in a hollow jacket through which water at constant temperature can be circulated. The interior faces of the water jackets are heavily gilded to prevent corrosion.

¶ The use of daylight is made possible by employing a compensator to neutralise the dispersion of the liquid and thus to give an achromatic field. The compensator consists of two direct vision prisms which are rotated at equal rates in opposite directions by turning a milled head, and together form a system of variable dispersion.

¶ The compensator is provided with a scale, readings on which give *dispersions* by reference to printed tables provided with instrument.

¶ To make a measurement, a drop of the liquid to be investigated is introduced between the prisms. On looking through the eye-piece and moving the index a dark shadow with a sharply defined edge comes into the field of view. This edge is brought on to the cross lines in the eye-


1
2
3
4
5
9
9
9
9
8
7

piece, and the corresponding refractive index read off on the divided scale.

¶ The dividing of the scale (which is of non-corrosive metal) is effected by a fully automatic device of our own design and construction.

¶ A test piece of glass, on which is engraved its refractive index, is supplied with each instrument, for the purpose of checking the setting, and simple means are provided for correcting the setting should it become necessary.

¶ *Interchangeability and Replacement of Parts.*—All the instruments supplied after October 1st, 1918, have engraved on them a numerical symbol, which identifies the particular pattern. The instruments are standardised, and the parts interchangeable ; and on quotation of the pattern symbol, spare parts can be supplied from stock to replace damaged ones without detriment to the accuracy of the instrument — as, for instance, spare prisms mounted in their water-jackets, lenses, eye-pieces, mirrors, etc., etc. A list of groups of parts will be found on p. 13. Not only the mechanical, but the optical parts also are interchangeable.

¶ Those acquainted with the variations in refractive index of glass, even of glass from one

and the same melting, will be interested to learn the means taken by our control laboratory to standardise the Abbe prisms.

¶ A melting of glass of suitable refractive index and of good general quality having been selected, a piece is cut from every block of the melting. These pieces are polished plane parallel, and joined by our patent process* to form one piece, which is then polished plane parallel in a direction perpendicular to the former polished interfaces. The resulting plane parallel plate is then examined for differences in refractive index on our interferometers.† The melting is not allocated to the manufacture of refractometer prisms if the variations of refractive index are greater than 0.000,01.

¶ The melting at present being used will cut over two thousand pairs of these prisms, and we have reserved a sufficient quantity of this melting for purposes of replacement.

¶ *Aids to Use.*—Tables of refractive indices of industrial substances are in course of preparation.

---

* Full particulars will be found in British Patent 103,233/16. The process is also patented in the United States, France, Japan, Switzerland, Denmark, and patents have been applied for in Russia, Italy, Austria, and Holland.

† Full particulars will be found in British Patent 103,832/16. The apparatus has also been patented in the United States, France, Italy, Switzerland, Denmark, and patents applied for in Russia, Japan, Holland, and Austria.

Vol. I. "Refractive Indices of Essential Oils," is ready, Vol. II. "Refractive Indices of Oils, Fats and Waxes," will shortly be in the press, and other volumes will follow at intervals of a few months. The reference to the source of each measurement is given, so that the tables form a valuable bibliography with regard to each substance mentioned. The price is 15/- each volume.

¶ Our technical staff will deal promptly with any queries as to the use of the refractometers for special purposes; and the instruments may be seen and used at any time in our testing laboratories, at 75A Camden Rd., London, N.W.1.

¶ *Delivery* can now always be made within one month from receipt of order. Our output is now one instrument per diem.

¶ *Other printed matter* relative to the Abbe Refractometer, Model I.

Instructions for Use (includes a very complete description).

Dispersion Tables.

# PRICE
## OF THE ABBE REFRACTOMETER

Under present circumstances manufacturing costs of scientific apparatus are double those of normal times, and we have therefore been compelled to choose between raising the price of this instrument and lowering our customary standard of quality. We have chosen the former alternative, and the price at our Works in London of the Abbe Refractometer described above, complete with thermometer, and in case with lock and key, is at this date - - £47 : 0 : 0

Additional scale for percentage of "dry substance" for sugar work, extra - £3 : 7 : 6

(*In ordering this scale it should be stated whether it is required for temperatures of* 20° *C. or* 28° *C.*).

ø

## LIST OF REPLACE GROUPS OF PARTS

(*Individual parts are also interchangeable and can be sent if required.*)

| REFERENCE NO. (see page 9). | DESCRIPTION. | PRICE £ | s. | d. |
|---|---|---|---|---|
| 1 | Eye-lens, with cap and tube ... ... | 0 | 12 | 6 |
| 2 | Telescope, including field lens with cross lines and object glass ... ... ... | 4 | 7 | 0 |
| 3 | Compensator, complete with bracket for attachment to scale arc ... ... ... | 13 | 0 | 0 |
| 4 | Abbe Prisms (top and bottom) in water jackets complete ... ... ... | 14 | 10 | 0 |
| 5 | Scale reader, complete with lens and illuminating glass ... ... ... ... | 1 | 0 | 0 |
| 6 | Thermometer with adapter (not shown in figure) ... ... ... ... ... | 0 | 7 | 0 |
| 7 | Base ... ... ... ... ... | 0 | 10 | 6 |
| 8 | Mirror, mounted, with support ... ... | 1 | 3 | 0 |
| 9, 9, 9, 9 | Upright, with scale arc, centre, and reader arm with index glass and reader fitting... | 11 | 10 | 0 |

The above groups of parts together make up the complete instrument. Full instructions accompany each replace part or group of parts.


W. H. SMITH & SON
STAMFORD STREET
LONDON
S.E